

Attorney Docket No.: 01CON334P
Application Serial No.: 09/782,791

REMARKS

By the present amendment, claims 1, 5, 16, 20, 30, 38, 45, 49, 55, 58, 63, and 66 have been amended. Thus, after the present amendment, claims 1-70 remain in the present application. Reconsideration and allowance of outstanding claims 1-70 in view of the above amendments and following remarks are requested.

A. Rejections of Claims 1, 2, 4, 5, 12-17, 19, 20, 27-29, 45, 46, 48, 49, 54-56, and 58 under 35 USC §102(e)

The Examiner has rejected claims 1, 2, 4, 5, 12-17, 19, 20, 27-29, 45, 46, 48, 49, 54-56, and 58 under 35 USC §102(e) as being anticipated by U.S. Patent Number 6,453,289 B1 to Ertem, et al. ("Ertem"). For the reasons discussed below, Applicant respectfully submits that the present invention, as defined by independent claims 1, 16, 45, and 55, is patentably distinguishable over Ertem.

Embodiments according to the present invention relate to digital speech coding systems having noise suppression capabilities. Conventional frequency-domain noise suppression techniques reduce some background noise in speech frames. However, the conventional frequency-domain techniques introduce significant speech distortion if the background noise is excessively suppressed. The frequency-domain noise suppression techniques may produce a relatively unnatural sound overall, especially when the background noise is excessively suppressed.

Embodiments according to the present invention relate to a noise suppression system and method that accurately reduces the background noise in a speech coding system.

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Advantageously, the present system utilizes a gain factor G_f to suppress the background noise in the time domain while maintaining the speech signal. Independent claims 1, 16, 45, and 55 have been amended in order to further illustrate aspects of the present invention. Amended independent claims 1, 16, 45, and 55 recite language indicating that at least one gain is adjusted as a function of noise characteristic for attenuating background noise in at least one frame, wherein the at least one gain is adjusted according to a gain factor, the gain factor facilitating time-domain background noise attenuation.

In contrast, Ertem utilizes a voice activity detector (VAD) that employs line spectral frequencies and enhanced input speech which has undergone noise reduction to generate a voice activity flag. A gain function is smoothed both across frequency and time in an adaptive manner based on an estimate of the signal-to-noise (SNR) ratio. Ertem does not disclose, teach, or even suggest adjusting at least one gain as a function of noise characteristic for attenuating background noise in at least one frame, wherein the at least one gain is adjusted according to a gain factor, the gain factor facilitating time-domain background noise attenuation.

For the foregoing reasons, Applicant respectfully submits that the present invention as defined by amended independent claims 1, 16, 45, and 55 is not taught, disclosed, or suggested by Ertem. Thus, amended independent claims 1, 16, 45, and 55 are patentably distinguishable over Ertem. As such, the claims depending from amended independent claims 1, 16, 45, and 55 are, *a fortiori*, also patentably distinguishable over Ertem for at least the reasons presented above and also for additional limitations contained in each dependent claim.

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B. Rejections of Claims 3, 18, 30-34, 42-44, 47, 57, and 63-66 under 35 USC §103(a)

The Examiner has rejected claims 3, 18, 30-34, 42-44, 47, 57, and 63-66 under 35 USC §103(a) as being obvious with respect to Ertem. For the reasons discussed below, Applicant respectfully submits that the present invention, as defined by amended independent claims 1, 16, 30, 45, 55, and 63, is patentably distinguishable over Ertem.

Independent claims 1, 16, 30, 45, 55, and 63 have been amended in order to further illustrate aspects of the present invention. Amended independent claims 1, 16, 30, 45, 55, and 63 recite language indicating that at least one gain is adjusted as a function of noise characteristic for attenuating background noise in at least one frame, wherein the at least one gain is adjusted according to a gain factor, the gain factor facilitating time-domain background noise attenuation. Ertem does not disclose, teach, or even suggest adjusting at least one gain as a function of noise characteristic for attenuating background noise in at least one frame, wherein the at least one gain is adjusted according to a gain factor, the gain factor facilitating time-domain background noise attenuation.

For the foregoing reasons, Applicant respectfully submits that the present invention as defined by amended independent claims 1, 16, 30, 45, 55, and 63 is not taught, disclosed, or suggested by Ertem. Thus, amended independent claims 1, 16, 30, 45, 55, and 63 are patentably distinguishable over Ertem. As such, the claims depending from amended independent claims 1, 16, 30, 45, 55, and 63 are, *a fortiori*, also patentably distinguishable over Ertem for at least the reasons presented above and also for additional limitations contained in each dependent claim.

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C. Rejections of Claims 6-11, 21-26, 35-41, 50-53, 59-62, and 67-70 under 35 USC §103(a)

The Examiner has rejected claims 6-11, 21-26, 35-41, 50-53, 59-62, and 67-70 under 35 USC §103(a) as being obvious with respect to Ertem and U.S. Patent Number 6,161,090 to Chandran, et al. ("Chandran"). Applicant respectfully submits that claims 6-11, 21-26, 35-41, 50-53, 59-62, and 67-70 depend from amended independent claims 1, 16, 30, 45, 55, and 63, respectively, and thus, claims 6-11, 21-26, 35-41, 50-53, 59-62, and 67-70 should be allowed at least for the same reasons discussed above in conjunction with patentability of amended independent claims 1, 16, 30, 45, 55, and 63.

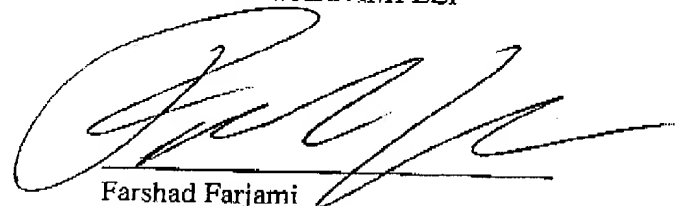
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D. Conclusion

Based on the foregoing reasons, the present invention, as defined by amended independent claims 1, 16, 30, 45, 55, and 63, and claims depending therefrom, is patentably distinguishable over the art cited by the Examiner. Thus, claims 1-70 pending in the present application are patentably distinguishable over the art cited by the Examiner. As such, and for all the foregoing reasons, an early Notice of Allowance directed to all claims 1-70 pending in the present application is respectfully requested.

Respectfully Submitted,
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